QUIZ #5 – Solutions
Each problem is worth 5 points

15 points total

1.
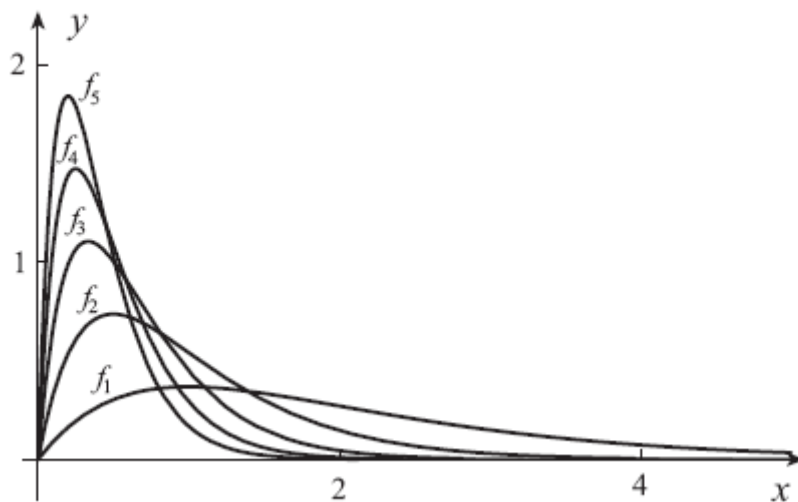
The limit of the sequence $\{n \sin (4/n)\}$ as $n \to \infty$ is equal to the limit of the function $x \sin (4/x)$ as $x \to \infty$, provided the limit of the function exists. When we use L'Hôpital's rule,

$$\lim_{n \to \infty} n \sin \left(\frac{4}{n}\right) = \lim_{x \to \infty} x \sin \left(\frac{4}{x}\right) = \lim_{x \to \infty} \frac{\sin (4/x)}{1/x} = \lim_{x \to \infty} \frac{-(4/x^2) \cos (4/x)}{-1/x^2} = 4.$$

2.

$$\text{The limit function is } f(x) = \lim_{n \to \infty} \frac{n^2 x}{e^{nx}}$$

$$= \lim_{n \to \infty} \frac{2nx}{x e^{nx}} = \lim_{n \to \infty} \frac{2x}{x^2 e^{nx}} = 0.$$

3.

Since the radius of convergence is $R = \lim_{n \to \infty} \left| \frac{n^3 3^n}{(n+1)^3 3^{n+1}} \right| = \frac{1}{3}$, the open interval of convergence is $-1/3 < x < 1/3$.